Alternative 15

CALFED
BAY-DELTA
PROGRAM



B-001238

## Alternative 15 - Summary

# Large West-Side Storage and Conveyance

## Emphasis

This alternative consolidates all major diversions on the Sacramento River and in the Delta to Shasta Lake and the Thermalito Afterbay and conveys water along the west side of the Sacramento Valley to off-stream storage reservoirs, groundwater storage, and to south Delta pumps.

## Distinguishing Features

This alternative is intended to provide a **high** level of resource improvement and conflict resolution.

| Physical/Structural | Operational/Management | Institutional/Policy |
|---|---|---|
| • New diversion facilities at Shasta Lake and the Thermalito Afterbay<br>• New isolated conveyance facility between these diversions and new storage reservoirs on the west side of the Sacramento Valley and to the south Delta export pumps<br>• Moderate level of habitat restoration in the Bay, the Delta, and in the Sacramento and San Joaquin Rivers<br>• New screens on remaining high and moderate priority diversions<br>• Moderate level of levee improvements | • Manage reservoirs to provide improved flows and temperatures for fish<br>• Retain stormwater runoff and construct wetlands to improve the water quality of the rivers and Delta<br>• Obtain 100,000 AF on San Joaquin River and manage for environmental and water quality purposes<br>• Groundwater banking and conjunctive use to work in concert with surface supplies to add flexibility in operations<br>• Pollutant source controls and enforcement for agricultural drainage, establish water quality BMPs, pest control, and remediate on-site mine drainage | • Funded levee improvements, emergency management plan, and landside buffer zones to reduce system vulnerability |

## Benefits

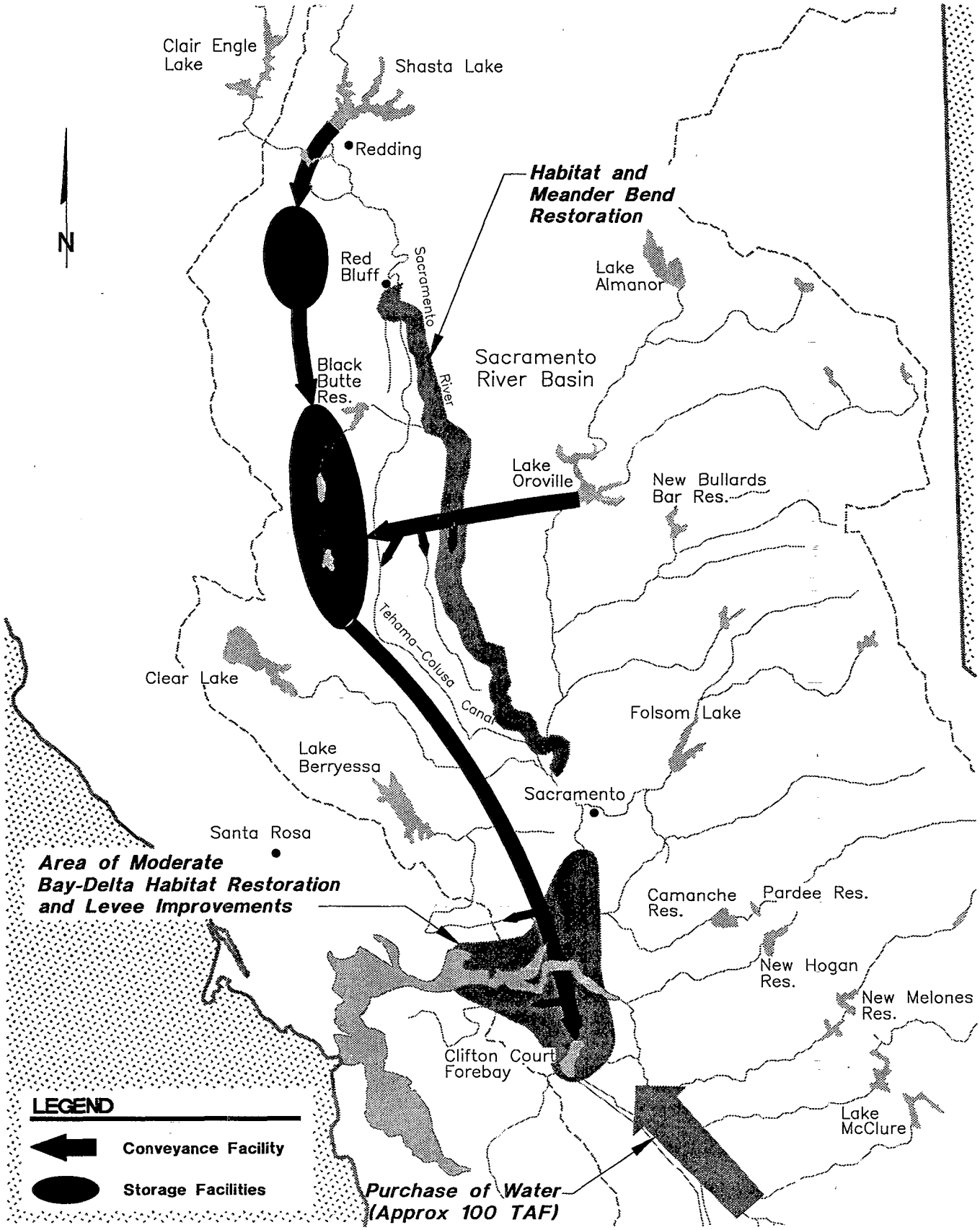
- High level of Bay, Delta, and river habitat restoration, improves control of flows in rivers, and reduces entrainment impacts on Sacramento River and in Delta
- Reduces vulnerability of Delta islands and Delta water supplies, improves flood control
- Increases water supply reliability, improves flexibility of diversion timing, and increases transfer opportunities, particularly north-south transfers
- Improves export water quality

## Constraints and Concerns

- Environmental impacts associated with new storage reservoirs and conveyance facilities
- Possible reduction in south Delta water quality
- Uncertainty about the amount of flood flows that can be diverted into storage

# Large West-side Storage and Conveyance

## Alternative 15

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CALFED BAY-DELTA PROGRAM

# Alternative 15
# Large West-Side Storage and Conveyance

## Overview

This alternative emphasizes a comprehensive combination of habitat restoration, system reliability improvements, and actions to expand water supply, achieving a high level of benefits. Major diversions now impacting fisheries will be relocated and consolidated to upstream locations in existing reservoirs, eliminating entrainments and improving export water quality. Large water storage facilities will be constructed upstream of the Delta, increasing the capacity to capture, store, and efficiently use flows for environmental and water supply benefits.

*major diversions in Sacramento river and Delta relocated*

High quality water will be diverted during high flows from Shasta Lake and the Feather River at Thermalito Afterbay, and conveyed to new off-stream storage facilities totaling 8 to 10 million acre-feet for "banking" on the west side of the Sacramento Valley. Operation of Shasta and Oroville reservoirs would be modified to operate in concert with the new reservoirs but would continue to meet instream flow standards. The conveyance system from the new reservoirs would cross under the Delta and terminate at the current south Delta pumps to improve water quality.

*approximately 8-10 million AF of new upstream storage*

Sacramento River diversions such as Red Bluff and Glen Colusa Irrigation District would be eliminated and irrigation districts would receive stored water. Turnouts along the new conveyance system would serve west-side agriculture and groundwater conjunctive use areas. A large transfer facility would be constructed from the new reservoirs to pumps in the south-Delta, with possible additional interties to the North Bay Aqueduct, Contra Costa Canal, the Mokelumne Aqueduct, and the South Bay Aqueduct. Water will also be purchased from San Joaquin River users to improve fish transport through the Delta and improve south Delta water quality.

*large 10,000-15,000 cfs isolated cross-Delta facility improves water quality*

Environmental restoration and water supply actions in this alternative are combined with actions to improve levee stability and protect land uses and infrastructure in the Delta. Upstream of the Delta, habitat restoration and screening of moderate and high priority diversions will increase fish populations. Delta levees will be improved to protect critical western islands and islands with important local and regional infrastructure or important habitat. Restoration of riverine and riparian habitat and tidal wetlands around Suisun Bay, in combination with substantial levee improvements in the Delta, will greatly increase fish habitat and decrease system vulnerability. Water quality improvements in the Delta are achieved through pollutant source control actions and water augmentation.

*improved habitats on Sacramento and San Joaquin Rivers*

*75-125 miles of habitats along levees*

By combining new diversion points for the Sacramento River and the Delta exports and removing them from estuary and river system, this alternative allows diversions to be managed to reduce entrainment and improve water quality. Additional water storage will further maximize flexibility to meet Delta needs,

while moderate levee and habitat improvements will provide environmental and system infrastructure benefits.

# Physical and Structural Features

## *Habitat Restoration*

| Activities | Benefits |
|---|---|
| • Restore riparian, shaded riverine, and shallow water habitat along the **Sacramento River channel** between Sacramento and Collinsville | • Provides substantial improvement in aquatic habitat as well as improvements in water supply reliability and water quality<br>• Increases survival and spawning success of anadromous and Delta native fish |
| • Restore **upper Sacramento River** habitat and natural channel functions | • Increases survival and spawning success of anadromous fish |
| • Restore **Delta and floodway corridor** shallow water, riparian, terrestrial, and tidal wetland habitat | • Provides spawning areas for Delta native fish and forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Provides improvements in water supply reliability and water quality |
| • Restore approximately 75 to 125 miles of shallow water, riverine, and riparian habitat along **Delta levees** | • Provides spawning areas for Delta native fish and forage areas and escape cover for juvenile salmon, Delta smelt, splittail, and other species. Provides improvements in water supply reliability and water quality |
| • Restore and protect **channel islands** from erosion and enhance habitat | • Provides habitat for aquatic and terrestrial plant and animal species<br>• Improves water quality |
| • Restore about 1,500 to 2,500 acres of tidal wetlands in **Suisun Bay** | • Provides wet year spawning habitat for Delta smelt, rearing areas for salmon, and wildlife habitat (e.g. canvasback and redhead ducks) |
| • Restore riverine channel features in the **San Joaquin River** above the Delta to lower water temperature and to protect young fish from predation and straying | • Improves fish survival |

| Considerations |
|---|
| • **Sacramento River Channels** – Feasible and cost-effective habitat restoration implemented between Sacramento and Collinsville.<br>• **Upper Sacramento River** – Create meander belts where feasible (e.g., Red Bluff to Colusa) and riparian sections in other areas (e.g., Colusa to Knights Landing).<br>• **Delta** – Candidate areas for shallow water habitat restoration include Prospect Island, Liberty Island, Little Holland Tract, Hastings Tract, Yolo Bypass, and the southeast Delta. Candidates for Delta levee habitat restoration include Twitchell Island along Threemile Slough and Sevenmile Slough, Georgiana Slough, and the North and South Forks of the Mokelumne River.<br>• **Floodway Corridors** – Habitat restoration must not impair capacity of floodways.<br>• **Suisun Bay** – Convert diked wetlands or create tidal wetlands with dredge spoils between Collinsville and Carquinez Strait.<br>• **San Joaquin River** – Confine wide, shallow channels and isolate in-channel gravel quarry areas. May not be self-sustaining. |

## *Water Transport*

| Activities | Benefits |
|---|---|
| • Construct a **new diversion** from the Feather River system connected to the Thermalito Afterbay<br>• Construct a new diversion on the Sacramento River in Shasta Lake<br>• Eliminate Red Bluff, GCID, South Delta diversions | • Anadromous fish and Delta native fish no longer exposed to major diversions<br>• Improves water quality because the diversion is above major pollution sources |
| • Construct a **new conveyance facility** to transport water from the new diversion points to offstream storage and existing pumping plants in the south Delta. Intertie with west-side irrigation districts and groundwater conjunctive use areas | • Improves water quality for export users<br>• Offers flexibility for irrigation districts to exchange water and to manage conjunctive use of groundwater<br>• Offers the capability to provide water supplies to users on the North Bay Aqueduct, the Mokelumne Aqueduct, Contra Costa Canal, and the South Bay Aqueducts |

| Considerations |
|---|
| • Diversion and conveyance facilities from Thermalito Afterbay sized to transport up to 2,000-7,000 cfs to new storage facilities.<br>• Diversion and conveyance at facilities from Shasta Lake Dam sized to transport up to 5,000-10,000 cfs to new storage facilities.<br>• Manage reservoirs to provide improved flows and temperatures for fish.<br>• Divert mainly during flood flows to minimize fisheries impacts.<br>• From the new off-stream storage facilities convey 15,000 to 20,000 cfs through siphons and canals across Delta to avoid environmental, water quality, and flood conveyance impacts. |

## *Water Storage*

| Activities | Benefits |
|---|---|
| • Develop about 8 to 10 million AF of new storage capacity at off-stream reservoir sites on the west side Sacramento Valley streams for environmental, urban, and agriculture beneficial uses | • Adds new major storage and supply to Delta<br>• Improves reliability to water supply exports<br>• Adds flexibility in flow releases for environmental and quality purposes in Delta<br>• Allows Shasta to be operated to improve habitat in the upper Sacramento River<br>• Storage of flood flows could relieve some of Shasta flood control space for carry over storage |
| **Considerations** | |
| • New off stream storage at sites between Shasta and Lake Berryessa.<br>• Operate storage coordinated with new operational policies on Shasta and Oroville Reservoirs.<br>• Potential water savings from isolating diversions may provide additional water to beneficial users. | |

## *Fish Protection and Transport*

| Activities | Benefits |
|---|---|
| • Construct a **San Joaquin River bypass** at the head of Old River | • Encourages outmigrating fish to stay in San Joaquin River<br>• Allows for managing flows down Old River |
| • Install **fish screens** on remaining moderate and high priority diversions in the Delta | • Reduces entrainment of fish |
| **Considerations** | |
| • Select diversions remaining for screening according to criteria including size of intake, location, peril to fish, and screening feasibility. | |

## *Flood Protection and Levee Stabilization*

| Activities | Benefits |
|---|---|
| • Provide a **moderate level of protection and stabilization** of Delta levees through levee maintenance and stabilization actions | • Manages vulnerability of Delta land use and infrastructure<br>• Manages vulnerability of Delta water supply to salinity intrusion<br>• Manages vulnerability of Delta ecosystem functions<br>• Provides opportunities for habitat restoration |
| • **Improve flood conveyance capacity** of Delta channels through channel maintenance and improvements | • Manages vulnerability of Delta functions<br>• Improves flood conveyance<br>• Provides opportunities for habitat restoration |

| Considerations |
|---|
| • Provide flood protection equivalent to Army Corps of Engineers PL 99 standard for these islands:<br>All critical western islands such as Jersey Island.<br>Islands with important regional infrastructure (e.g., Highway 12) such as Terminous Island.<br>Islands with both valuable habitat and important regional infrastructure (e.g., transmission lines) such as Lower Roberts Island.<br>• Upgrade all other Delta levees to meet at least the Hazard Mitigation Plan (HMP) standards.<br>• Integrate protection and stabilization of levees with Delta habitat restoration activities.<br>• Provide stable funding mechanism for ongoing levee and habitat monitoring, maintenance, and management.<br>• Improvements to channels include dredging for sediment removal in channels with restricted flood capacity. |

# Operational and Management Features

## *Water Diversion Management*

| Activities | Benefits |
|---|---|
| • **Acquire about 100,000 AF** of water from willing sellers in the **San Joaquin basin** | • Transports fish through San Joaquin River and Delta<br>• Improves water quality |
| • Evaluate need for continued use of **behavioral barriers** for anadromous fish | • Diverts anadromous fish from areas of potential entrainment and predation |
| **Considerations** | |
| • Can use San Joaquin environmental water for pulse flows for fish transport or diluting poor quality flows.<br>• Evaluate continued use of an acoustic barrier at the mouth of Georgiana Slough.<br>• Evaluate behavioral barriers for Threemile Slough. | |

## *Fisheries Management*

| Activities | Benefits |
|---|---|
| • **Mark salmon** produced in hatcheries | • Facilitates selective catch of hatchery salmon by commercial and recreational fisheries |
| **Considerations** | |
| • Actions are intended to to maintain recreational and commercial fisheries as well as enhance native salmon stocks.<br>• Need to assess impact of incidental mortality on native (unmarked) fish. | |

### *Water Quality Management*

| Activities | Benefits |
|---|---|
| • Increase enforcement of source control regulations for **agricultural drainage** and implement farming best management practices for water quality | • Improves Delta water quality |
| • Increase enforcement of source control regulations for **urban and industrial runoff** and implement best management practices for water quality | • Improves Delta water quality |
| • Integrate existing **land retirement and fallowing** programs for agricultural lands with drainage problems | • Improves Delta water quality |
| • Integrate existing and support appropriate on-site **mine drainage remediation** measures to the maximum extent feasible | • Improves Delta water quality |
| **Considerations** | |
| • Identify priority pollutant sources such as Iron Mountain Mine and west-side San Joaquin agricultural lands.<br>• Provide regulatory and institutional incentives for implementation of remediation measures. | |

## Institutional and Policy Features

### *Water Supply*

| Activities | Benefits |
|---|---|
| • Expand groundwater banking and conjunctive use | • Allow for flexibility of surface and groundwater to optimize supply |
| **Considerations** | |
| • Basins such as Stoney Creek and .Butte Basin. | |

### *Habitat Programs*

| Activities | Benefits |
|---|---|
| • Integrate recommended **habitat restoration actions from other programs**, including the Anadromous Fish Restoration Program | • Provides additional habitat restoration |
| • Establish programs to **preserve agricultural land uses** that provide valuable habitat functions | • Protects existing habitats |
| • Establish a CALFED team to coordinate and **expedite habitat restoration permits** | • Accelerates acquiring permits for environmental restoration projects and other CALFED projects |
| • Establish and fund a management program and rapid response team to **manage introduced species** | • Protects existing valuable species and habitat |

| Activities | Benefits |
|---|---|
| • Establish a program to identify and use clean **dredge materials** from the Delta for habitat restoration and levee maintenance in the Delta | • Provides materials for habitat and levee improvements |
| • Encourage farmers and levee maintenance districts to **leave habitat areas undisturbed** by working with resource agencies | • Protects existing habitats<br>• Increases flexibility in maintenance programs |
| **Considerations** | |
| • Coordinate activities to avoid duplication. | |

## *Water Quality Standards*

| Activities | Benefits |
|---|---|
| • **Reevaluate Delta export/inflow ratios** during triennial reviews as habitat effectiveness is realized | • Allows for higher level of water transfer as fishery populations improve |
| **Considerations** | |
| • Monitor to verify effectiveness of habitat and entrainment reduction programs. Develop an adaptive management program to modify habitat restoration and export/inflow ratios in response to improved sustainability of important species. | |

## *Management of System Vul*nerability

| Activities | Benefits |
|---|---|
| • Establish and fund an **emergency levee management plan** to respond to levee failures | • Provides resources to protect Delta functions through proactive and preventative measures |
| • Establish **landside buffer zones** adjacent to levees on islands with deep peat soils | • Provides increase in stability of Delta levees and reliability of Delta functions by reducing subsidence adjacent to levees<br>• Could be used to provide habitat benefit |
| **Considerations** | |
| • Determine extent and cost effectiveness of levee management programs and buffer zones.<br>• Buffer strip approximately 100 to 150 yards wide dedicated to shallow wetlands. | |

# Preliminary Assessment

## *Benefits*

- Improves quality of export water
- Improves water supply reliability through increased storage and reduced impacts on fisheries
- Improves flood control and system reliability
- High level of Bay, Delta, and river habitat restoration, improves control of flows and temperatures in rivers, and reduces entrainment impacts on Sacramento River and in Delta

## *Constraints and Concerns*

- Environmental impacts associated with new storage reservoirs and conveyance facilities
- Possible reduction in south Delta water quality
- Uncertainty about the amount of flood flows that can be diverted into storage